NERL Research Abstract

EPA's National Exposure Research Laboratory
GPRA Goal 8 - Sound Science
APM # 631

Significant Research Findings

Final Methods Manual for the Collection of Fish, Macroinvertebrates, Periphyton, Microbial, Respiration, Sediment Toxicity, Fish Tissue, Chemical and Physical Habitat Samples

Purpose

Guidance and methods were reviewed and documented for sampling rivers from boats for biological, physical, and chemical conditions. Three documents were prepared to meet specific objectives. When combined, they offer a comprehensive resource for determining the state of the nation's riverine ecosystems:

- a comparison of the ecological assessment methods used by five state and federal programs,
- a manual of logistics for collecting ecological data from non-wadeable rivers, and
- a field operations manual prepared for the collection of ecological data from non-wadeable rivers for the Environmental Monitoring and Assessment Program-Surface Waters (EMAP-SW).

Research Approach

Comparisons of Boating and Wading Methods Used by the USEPA- EMAP-SW, USGS-NAWQA, USEPA-RBP, Ohio EPA, and Maryland DNR-MBSS Programs to Assess the Status of Flowing Waters

Sampling methods currently in use were reviewed and compiled: EPA's Environmental Monitoring and Assessment Program for Surface Waters (USEPA-EMAP-SW), U.S. Geological Survey's National Water-Quality Assessment program (USGS-NAWQA), EPA's Rapid Bioassessment Protocol (USEPA-RBP), Ohio Environmental Protection Agency's flowing waters program (Ohio EPA), and Maryland's Department of Natural Resources's Maryland Biological Stream Survey program (MDNR-MBSS). The USEPA-EMAP-SW, USGS-NAWQA and USEPA-RBP programs are designed to assess rivers on the National and Regional levels. The Ohio EPA and MDNR-MBSS programs are concerned with assessing the rivers located in their respective states. The resulting differences in scale are reflected in the way each program developed and currently implements their protocols.

Logistics of Ecological Sampling on Large Rivers

This document describes information needed to safely execute a field sampling effort on rivers that require boats. The information largely comes from the personal experience of the authors, who bring intense field sampling experience, as well as information from the American Red Cross, the National Institute for Occupational Safety and Health, and the U.S. Coast Guard. The equipment section describes good practices for selecting and maintaining equipment and making field repairs. Safety topics cover heavy equipment, field attire, electric shock, chemicals, storms, drowning, boat rescue, first aid, and cardiopulmonary resuscitation. Other issues include details of gaining site access and legal issues, crew logistics, data recording, and sample tracking and storage.

Environmental Monitoring and Assessment Program-Surface Waters: Field Operations and Methods for Measuring the Ecological Condition of Non-Wadeable Streams

The procedures presented in this manual were developed based on standard or accepted methods, modified to meet EMAP sampling requirements. They are intended for use in field studies sponsored by EMAP. In addition, information on data management, safety and health, and other logistical aspects is integrated into the procedures. Procedures are described for collecting field measurement data and/or acceptable index samples for several response and stressor indicators, including water chemistry, physical habitat, benthic macroinvertebrate assemblages, aquatic vertebrate assemblages, fish tissue contaminants, periphyton assemblages, and sediment community metabolism. The manual describes field implementation of these methods and the logistical foundation constructed during field projects. Flowcharts and other graphic aids that provide summaries of specific field activities and tables that give step-by-step instructions are provided in a form that can be extracted and bound separately to make a convenient field reference guide. The manual also includes example field data forms for recording measurements and observations made in the field, sample tracking information, and checklists of all supplies and equipment needed for each field task.

Major Findings and Significance

Comparisons of Boating and Wading Methods Used by the USEPA-EMAP-SW, USGS-NAWQA, USEPA-RBP, Ohio EPA, and Maryland DNR-MBSS Programs to Assess the Status of Flowing Waters

This document was designed to provide an overview of the biological, physical and chemical methods of selected stream biomonitoring and assessment programs. The target audiences are researchers working with the data generated from one or more of these programs, yet unfamiliar with the basics of the sampling procedures. This document can help design or improve bioassessment and monitoring programs and provide guidance in the design of research and field work using methods reviewed in this text, including field

comparisons of each method. Individuals intending to implement any of these protocols should obtain a copy of the agency's original protocol manual and are encouraged to contact the agencies in order to gain the insight of the scientists who developed these protocols or who use them on a regular basis.

Logistics of Ecological Sampling on Large Rivers
The objectives of this document are to provide an overview of the logistical problems associated with the ecological sampling of large rivers and to suggest solutions to those problems. It is intended to be used as a resource for individuals preparing to collect biological data from large rivers. Its greatest benefit to project planners will be the knowledge and awareness necessary to provide a greater level of safety to the crew members. A large river can be made relatively safe with adequate training and preparation. This document will also provide the means needed to ensure the accurate and complete collection of data. The execution of preparatory steps outlined in this document will minimize the collection of inaccurate or incomplete data, thereby decreasing wasted time and money.

Environmental Monitoring and Assessment Program-Surface Waters: Field Operations and Methods for Measuring the Ecological Condition of Non-Wadeable Streams
This document presents field-related sampling and data collection activities for rivers and streams that require a boat and were used during EMAP sampling. These procedures are designed for use during a one-day visit by a crew of four or five persons to sampling sites located on larger, non-wadeable streams and rivers (generally stream order 4 or greater in the Mid Atlantic and Northwestern U.S.). This document describes procedures for collecting data, samples, and information about biotic assemblages, environmental measures, or attributes of indicators of non-wadeable stream ecosystem condition and is a valuable resource for understanding how samples were collected in the EMAP.

Research Collaboration and Publications

Collaborators included the National Exposure Research Laboratory, the National Health and Environmental Effects Research Laboratory, the Ohio Environmental Protection Agency and Maryland Department of Natural Resources, the Unites States Geological Surveys and the EPA Regional Offices and states and tribes in Regions III, X, IX and VIII.

Flotemersch, J.E., Autrey, B.C., Cormier, S.M. Comparisons of Boating and Wading Methods Used by the USEPA- EMAP-SW, USGS-NAWQA, USEPA-RBP, Ohio EPA, and Maryland DNR-MBSS Programs to Assess the Status of Flowing Waters. Draft.

Flotemersch, J.E., Autrey, B.C., Cormier, S.M. Logistics of Ecological Sampling on Large Rivers. Draft.

Lazorchak, J.M., Peck, D.V. Environmental Monitoring and Assessment Program-Surface Waters: Field Operations and Methods for Measuring the Ecological Condition of Non-Wadeable Streams. Draft.

Future Research

Comparisons of Boating and Wading Methods Used by the USEPA- EMAP-SW, USGS-NAWQA, USEPA-RBP, Ohio EPA, and Maryland DNR-MBSS Programs to Assess the Status of Flowing Waters. Four rivers, sixty sites, in Regions IV and V were sampled to compare these methods. Advantages and disadvantages of these methods will be evaluated. Inquiries may be directed to Susan Cormeir, Joseph Flotemersch, or Brad Autrey.

No additional research is planned for *Logistics of Ecological Sampling on Large Rivers*. Form more information, contact Susan Cormeir, Joseph Flotemersch, or Brad Autrey.

Environmental Monitoring and Assessment Program-Surface Waters: Field Operations and Methods for Measuring the Ecological Condition of Non-Wadeable Streams. EMAP will be conducting a 4 year pilot study in the western U.S. starting in 2000 and either all or some portion of this manual will be used or modified to collect samples. For additional information, contact James J. Lazorchak or David V. Peck.

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